



PREVALENCE OF RISK FACTORS OF CHRONIC KIDNEY DISEASE AMONG ADULTS IN A RURAL POPULATION IN BAYELSA STATE, SOUTH-SOUTH NIGERIA

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ABSTRACT

Context: In recent times, there has been an increase in the prevalence of non-communicable diseases such as hypertension, diabetes, obesity, cardiovascular and chronic kidney disease (CKD) in Sub-Saharan Africa. The current burden of CKD is enormous.

Aims: The aim of the study was to identify the prevalence of risk factors of CKD among adults in a rural population in south-south geographical zone of Nigeria.

Settings and Design: This was a cross-sectional study of consenting adults presenting for routine health screening as part of activities to commemorate the 2013 world health day.

Methods and Material: The study location was at Ogboloma, a rural population in Bayelsa state in the south-south geographical zone of Nigeria. Socio-demographic data and other histories were obtained by interviewer administered questionnaire while clinical data were obtained by trained health practitioners. Data was analyzed with SPSS version 20.0.

Results: One hundred and thirty persons, including 48(36.9%) males and 82(63.1%) females, completed the study. The mean age (SD) of the studied participants was 48.6(14.8) yrs. Personal history of hypertension and diabetes was obtained in twenty-one (16.2%) and five (3.8%) participants respectively. Nine (6.9%) participants had a family history of hypertension while 8(6.1%) had a family history of diabetes. Twelve (9.2%) participants were current smokers. Hypertension was found in 61(46.6%) participants while 15(11.5%) were obese. Hyperglycaemia was found in 14 (10.7%) participants while 69 (52.7%) had proteinuria.

Conclusions: The prevalence of the risk factors of CKD in this rural community in Bayelsa south-south Nigeria was generally high

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INTRODUCTION

Demographic and epidemiologic transition is having its toll in Sub-Saharan Africa with an added tragedy of non-communicable diseases (NCDs) superimposed on a previous burden of infectious diseases.^[1] Adoption of western lifestyle has been shown to increase the prevalence of hypertension, diabetes, obesity and other NCDs leading to increasing rates of cardiovascular diseases and chronic kidney disease (CKD).^[2] Across rural communities in SSA, increasing urbanization is associated with a higher prevalence of lifestyle risk factors for NCDs.^[2] Hypertension and diabetes are reported to be on the increase. The overall prevalence of hypertension was estimated at 28.9% (30.6% in urban communities and 26.4% in rural communities) in a recent meta-analysis.^[3] while diabetes mellitus is prevalent in about 8-10% of Nigerians with a projected increase in the future.^[4] CKD is emerging as a public health problem worldwide.^[5] Globally, it is considered among the 12th leading cause of death and 17th cause of disability^[6]

Although early stages of CKD may be covert and only detected on routine screening^[7] it may ultimately progress to end stage renal disease (ESRD) which is life-threatening without adequate renal replacement therapy.^[8] The rate of progression is dependent on coexisting pathologies and presence of risk factors.^[9] Most patients with ESRD in low- and middle-income countries including Sub-Saharan Africa die because they cannot access renal replacement therapy due to the exorbitant cost. It is far more cost effective to prevent it. The preventive strategies to stem the tide of CKD include raising awareness of the general public, identifying individuals with risk factors for developing the disease, addressing the risk factors, and modifying the lifestyle of susceptible individuals.^[10,11] Hypertension and diabetes mellitus are primary screening targets. Other factors include age, ethnic, racial and familial factors and more lately, obesity.^[12]

There are only a few reports on the prevalence of these risk factors in the Niger Delta. In an earlier report, the prevalence

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of hypertension among civil servants in an urban location in Bayelsa state was 27.8%.^[13] In a later study done among hospital workers in an urban hospital in the same state, a prevalence of 21.3% was reported.^[14] Obesity and hyperglycemia were found in 23.8% and 2.7% participants respectively.^[14] These studies were however carried out in urban settings. It is not known whether they can be extrapolated to those living in rural communities. To the best of the authors' knowledge, there is paucity of such studies in traditional settings in Bayelsa State and by extension, the Niger Delta and South-South Nigeria. There is a need to fill this gap in research.

The aim of the study was to identify the prevalence of risk factors of CKD among adults in a rural population in Bayelsa state, south-south geographical zone of Nigeria.

MATERIALS AND METHODS

Study location

The study location was Ogboloma, a rural settlement in Kolokuma/Opokuma local government Area of Bayelsa state. Bayelsa State is an oil-rich state located in the Niger Delta region of South-south Nigeria. The exact population of Ogboloma is estimated at 4000. It is mainly an agrarian community. Most of the inhabitants are peasant farmers. Language spoken is mainly Ijaw and Pidgin English.

Study population

The study population comprised of all consenting adults at least 18 years old who presented for a routine health screening exercise organized to commemorate the World Health Day in 2013 with theme bordering on control of hypertension. Pregnant women and individuals with acute febrile illness were excluded from the study.

Study design

This was a cross sectional study including all adults at least 18 years of age who gave consent to be part of the study during the routine health screening exercise.

There was prior dissemination of information and invitation for the study through a local town crier after a meeting with the traditional council by the investigators. The venue of the screening was the community town hall. The details of the study were explained and informed consent obtained from the participants prior to the study.

The study was preceded by a session of health education on hypertension and CKD. Health education was given by one of the investigators in a very simplified manner in pidgin English and interpreted by a second investigator in Ijaw language. The health talk was enhanced by relevant visual cues.

Data collection and Clinical Evaluation

Socio-demographic and clinical details of each subject were obtained through interviewer-administered questionnaire. Socio-demographic data included age, sex, occupation, level of education, marital status, self-report of hypertension and diabetes with medications used, family history of hypertension and diabetes, history of tobacco and alcohol consumption. An alcoholic ingestion of at least 21 and 14 units for males and females respectively was considered as significant.

Weight was measured with a standard measuring scale calibrated in kilograms with subjects standing erect, bare-

footed, and without heavy clothing. Height was measured with a stadiometer with subjects standing feet together without shoes or head gear. Body mass index (BMI) was calculated as body weight in kilograms divided by the square of the height in meters. Obesity was defined as $BMI \geq 30 \text{ kg/m}^2$ while those with BMI between 25 and 30 kg/m^2 were considered 'overweight' according to the WHO guidelines.^[15] Blood pressure was measured with a standard Accosson mercury sphygmomanometer on the patients' right arm in the seated position with feet on the floor after at least a five-minute rest. Systolic and diastolic blood pressures were taken at Korotkoff phases 1 and 5 respectively to the nearest 2 mmHg. The average of two blood pressure measurements taken five minutes apart was used. Hypertension was defined as $SBP \geq 140 \text{ mmHg}$ and/or $DBP \geq 90 \text{ mmHg}$.^[16]

Clinical Management

When risk factors were identified, study participants received appropriate advice, medications where necessary and referrals for further evaluation and management

Ethical consideration

Approval for the study was obtained from the council of chiefs headed by the paramount ruler of the community. We also obtained ethical approval for the study from the NDUTH ethical review board.

Data Analysis

Data were collated, stored and analysed using statistical package for social sciences (SPSS) version 20 (IBM corporation NY, USA). Mean, standard deviation and range were obtained for quantitative data while frequency was obtained for categorical data. Continuous variables were compared using the independent samples student's T-test while the Chi-square test (or Fisher's exact) was used to compare categorical variables.

RESULTS

Socio-demographic Data of Participants

One hundred and forty participants commenced the study but only 130 (92.9%) persons completed it with available results. The mean age of the studied population was 48.6 ± 14.8 yrs and ranged from 20 -90 yrs. There were more females, 82 (63.1%) than males 48 (36.9%).

Eighteen one (61.8%) participants were currently married while fifteen (11.5%) were single. Over half of the participants (70; 53.8%) had less than secondary level of education. Males generally had a higher level of education ($p < 0.001$). Majority of the participants especially females were unskilled workers, 70 (53.8%). The demographic data in relation to gender is shown (table 1).

Prevalence of risk factors of CKD

Hypertension was found in 61 out of the 130 study participants giving a prevalence of 46.6%. Half (50%) of the men met the criteria for diagnosis of hypertension while 30 (36.6%) of the women did. This difference was however not statistically significant ($p > 0.05$).

Table 1 Demographics of study participants in relation to gender

Variable	Total population n=130	Males n=48	Females n=82	p-value
Age(yrs)				
Mean±SD	48.6±14.8	47.9±14.1	49.0±15.3	0.678
Age > 50(%)	58(44.6)	21(43.8)	37(45.1)	0.879
Age<50(%)	72(55.4)	27(56.2)	45(54.9)	
Education				
None	46(35.4)	3(6.2)	43(52.4)	0.000
Primary	24(18.5)	8(16.7)	16(19.5)	
Secondary	41(31.5)	25(52.1)	16(19.5)	
Tertiary	19(14.6)	12(25.0)	7(8.5)	
Occupation				
Skilled				0.000
Semi-skilled	17(13.1)	10(20.8)	7(8.5)	
Unskilled	18(13.8)	13(27.1)	5(6.1)	
Retired	70(53.9)	10(20.8)	60(73.2)	
unemployed	5(3.8)	4(8.3)	1(1.2)	
student	19(14.6)	11(22.9)	8(9.8)	
Marital status				
Single	15(11.5)	12(25.0%)	3(3.7%)	0.002
Married	80(61.6)	35(72.9%)	45(54.9%)	
Widowed	28(21.6)	0(0.0%)	28(34.1%)	
Seperated	05(3.8)	1(2.1%)	4(4.9%)	
Divorced	02(1.5)	0(0.0%)	2(2.4%)	

Table 2 Prevalence of risk factors for chronic kidney disease across gender

Variable	Total population n=130	Males n=48	Females n=82	p-value
Personal hx of HTN	21(16.2)	11(22.9)	10(12.2)	0.122
Personal hx of DM	5(3.8)	4(8.3)	1(1.2)	0.063
Family hx of HTN	9(6.9)	4(8.3)	5(6.1)	0.725
Family hx of DM	8(6.2)	4(8.3)	4(4.9)	0.466
Obesity	15(11.5)	3(6.2)	12(14.6)	0.121
Alcohol	35(26.9)	20(41.7)	15(18.3)	0.004*
Smoking	21(16.3)	18(37.5)	3(3.7)	0.000*
Elevated BP	54(41.5)	24(50.0)	30(36.6)	0.134
Hyperglycaemia	13(10.0)	5(10.4)	8(9.8)	0.350
Proteinuria	68(52.3)	21(43.8)	47(57.3)	0.135

hx = history. * statistically significant

Hyperglycaemia was found in 14 out of the 130 participants giving a prevalence of 10.7%. Two of these already had a personal history of diabetes and were on medications.

Out of the 130 participants, 21(16.2%) had a personal history of hypertension while 5(3.8%) had a personal history of DM. Nine (6.9%) participants had a family history of hypertension while 8(6.1%) had a family history of diabetes.

Thirty two (24.4%) participants were overweight while obesity was prevalent in 15(11.5%). Seven (6.5%) participants were underweight while the others (58.8%) were normal. Although obesity was more prevalent among the female folk, the difference did not reach statistical significance (p=0.121).

Twelve (9.2%) out of 130 participants were current smokers, while another twelve (9.2%) only smoked in the past. Seventeen smoked cigarettes, 5 took snuff while another 2 took cigar. Thirty five (26.7%) had a history of significant alcohol consumption while 96(73.3%) did not.

Proteinuria was found in 69(52.7%) of participants while haematuria was found in 4(3.0%) of the screened population. Five (3.8%) participants had glycosuria.

DISCUSSION

The risk factors of CKD screened for in this population included age, socio-economic class, hypertension, obesity, hyperglycaemia, proteinuria and haematuria as well as social habits like smoking and excessive alcohol consumption

About 45% of the participants in this population were at least 50 years old. There is a need for regular screening of individuals with increasing age because age has been clearly associated with CKD. For instance in the CREDIT study, the odds ratios of CKD ranged from 1.45 to 2.18 for every 10-year increase in age among subjects older than 30 years of age.^[17]

Hypertension is among the most common causes of CKD. In Nigeria, it is considered among the three top causes.^[18] The prevalence of hypertension at 46.6% in this study was high. This is consistent with recent documentation on hypertension from reports in similar communities in the Niger Delta. Okafor *et al* reported a prevalence of 41.4% in a swampy, rural community in River State^[19] while Akpa *et al* in an earlier study reported a prevalence of 40.8% in the main city of the same state.^[20] Ofili *et al* found a prevalence of 44% in neighboring Delta State.^[21] Factors that have been postulated to be responsible for the high prevalence of hypertension in this region include poor socioeconomic status, high salt intake, obesity and poor exercise.^[19,21]

Diabetes is also known to be a leading cause of CKD worldwide^[22] and is gaining an increasingly important role as a cause of CKD and ESRD in Sub-Saharan Africa^[23] including Nigeria^[24] The high prevalence of hyperglycemia in this study is therefore a cause for worry especially considering the fact that it was incidentally discovered in most of the cases. Obesity remains the number one preventable risk factor for chronic kidney disease because obesity largely mediates diabetes and hypertension, the two most common etiologies for end-stage kidney disease.^[25] However, obesity itself likely has independent effects on renal hemodynamics. Over one third of the participants were either overweight or frankly obese. Majority of the obese were women. Obesity has been reported to be more common among women in Africa.^[26]

Smokers were reported to be at five times greater risk of ESRD compared with non-smokers in a study.^[27] Although the effect of smoking on the development of CKD in normal kidneys has been controversial, a recent meta-analysis suggests evidence for cigarette smoking as an independent risk factor for incident CKD.^[28] Over a quarter of our participants had a history of tobacco use.

Long-term excessive alcohol consumption is an established risk factor for numerous chronic diseases, including liver disease, hypertension and stroke.^[29] However, the relationship between alcohol consumption and CKD appears controversial. While there have been reports of positive association between heavy drinking and CKD or ESRD,^[30] some studies have demonstrated no association.^[30,31] Conversely, a few studies have actually demonstrated an inverse relationship between them.^[32] There may be need for more studies in this regard.

Proteinuria was found in a whopping proportion of the screened population. There was no statistically significant difference between prevalence rates among males and females. The high prevalence of proteinuria in this study may be contributed to by other prevailing conditions such as urinary tract infection in this predominantly female population and

prostatic conditions or complications in this relatively aged population.

The prevalence of hematuria was 3% of the study population which compares with previous reports during similar screening exercise.^[33] Hematuria may be glomerular or non-glomerular in origin. Persistent glomerular haematuria may be indicative of kidney dysfunction and may also contribute to progressive renal injury.

This study has demonstrated a high prevalence of risk factors for renal disease in this rural population. This is likely to be the current case in other communities in Nigeria. Individuals with such indicators may benefit from early screening and intervention. In a study reported by Hallan *et al*, hypertension, diabetes mellitus or age>55 was the most effective strategy to detect patients with CKD.^[34] Patients with hypertension are less likely to suffer renal failure when blood pressure is optimized.^[35]

This study had some limitations. The study was a fall out of a community health screening exercise and not based on an epidemiological survey. It is therefore possible that the findings represented the burden of risk factors to CKD among those who were motivated to attend the health screening. The small sample size places a strain on the extent of generalization of the findings. Also certain aspect of the evaluation was based on self-report and ability to recall which may not always be reliable. There is a need to re-screen these participants on a later date to establish persistence of these risk factors.

In conclusion, our study findings have revealed that the prevalence of risk factors for CKD, such as hypertension, diabetes and obesity, among others, is high among adults in a rural community in Bayelsa state, South-South Nigeria. Health authorities in Nigeria ought to also target rural communities in the delivery of NCD preventative interventions.

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